

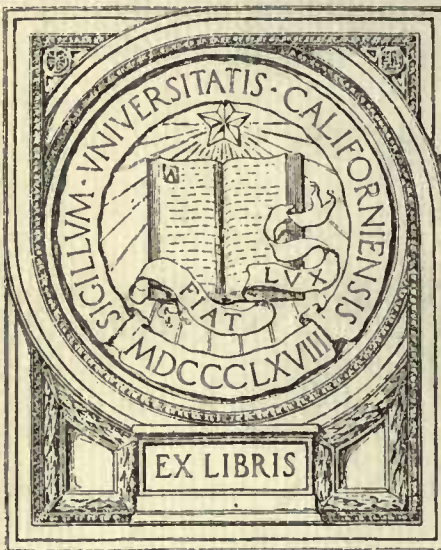
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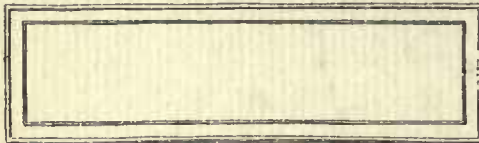


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DISEASES OF CONIFEROUS TREES.
James R. Weir.



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DISEASES OF CONIFEROUS TREES

BY

JAMES R. WEIR.

1912.

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b. DISEASES OF CONIFEROUS TREES.

The natural forests of the greater part of the western United States consist almost entirely of coniferous trees. The annual loss from wood-rotting fungi in the national forests amounts to a very large item. An average of 2 to 10 per cent of the mature trees in all the forests are attacked and rendered worthless. In some localities certain species, for example *Pinus monticola*, *Tsuga heterophylla*, *Abies grandis*, *A. lasiocarpa*, and *Pseudotsuga taxifolia* suffer to the extent of 50 to 75 per cent of the total stand in lumber feet.

The most destructive disease of the heartwood of conifers is caused by *Trametes pini* (Brot.) Fr. This fungus is not equally prevalent in all localities on the same species. It probably attacks nearly all species of conifers in the United States, except the junipers. The progress of the rot through the tree trunks is not very rapid, but the final effect is certain, as in the end it usually destroys the whole heart of the trunks and of portions of the limbs. In some instances trees are killed outright, but in the majority of cases they are so weakened by the fungus that they are broken off by the wind. This fungus rots the heartwood of the roots of trees also, and sometimes is communicated from tree to tree underground, where large roots of separate trees are in direct contact, thus passing from a diseased root to a healthy one.

The following species of trees are attacked by *Trametes pini* or its subspecies: *Abies balsamea*, *A. concolor*, *A. lasiocarpa*, *A. nobilis*, *Larix laricina*, *L. occidentalis*, *Picea engelmanni*, *P. mariana*, *P. rubens*, *P. sitchensis*, *Pinus contorta*, *P. echinata*

6. DISEASES OF CONIFEROUS TREES.

The natural forests of the greater part of the western United States consist almost entirely of coniferous trees. The annual loss from wood-destroying fungi in the national forests amounts to very large items. An average of 2 to 10 per cent of the mature trees in all the forests are attacked and rendered worthless. In some localities certain species, for example *Pinus monticola*, *Taxus heterophylla*, *Abies grandis*, *A. lasiocarpa*, and *Pseudotsuga taxifolia* suffer to the extent of 50 to 75 per cent of the total stand in lumber-land.

The most destructive diseases of the western conifers are caused by *Trametes pini* (Groer.) Berk. This fungus is not equally prevalent in all localities on the same species. It probably attacks nearly all species of conifers in the United States, except the Juniper. The progress of the rot through the tree trunk is not very rapid, but the final effect is certain, as in the end it usually destroys the whole heart of the trunk and of portions of the limbs. In some instances trees are killed outright, but in the majority of cases they are weakened by the fungus, and they are broken off by the wind. This fungus rot is the heaviest of the rot of trees killed, and sometimes is communicated from tree to tree underground, where living roots of separate trees are in direct contact. These passing from a diseased root to a healthy one.

The following species of trees are attacked by *Trametes* or its subspecies: *Abies balsamea*, *A. concolor*, *A. lasiocarpa*, *A. nobilis*, *Taxus latifolia*, *L. occidentalis*, *Picea engelmannii*, *P. mariana*, *P. rostrata*, *P. sitchensis*, *Pinus contorta*, *P. edulis*.

P. edulis, *P. flexilis*, *P. lambertiana*, *P. monticola*, *P. palustris*,
P. ponderosa, *P. resinosa*, *P. rigida*, *P. strobilus*, *P. strobiformis*,
P. taeda, *P. virginiana*, *Pseudotsugataxifolia*, *Thuja plicata*, *Tsuga*
canadensis, *T. heterophylla*, and *T. mertensiana*.

Polyporus schweinitzii Fr. ranks next in importance to
Trametes pini in the natural forests. It commonly attacks the heart
wood of the base or butts of the trunk and of the roots of coniferous
trees, especially the Douglas firs. The rot rarely extends farther
up the trunk than the first saw log. The fungus spreads from diseas-
ed trees to healthy ones underground, where larger roots come in con-
tact with each other. Where this takes place it is common to find
groups of trees affected with the fungus, and sometimes an entire
group of Douglas firs are killed outright. In most instances, how-
ever, the trees weakened by the fungus are either uprooted or broken
off by the winds before death.

The heart rot caused by *Polyporus schweinitzii* is of a red
brown color, breaking into coarse cubes; and has been found in the
following species of trees: *Abies amabilis*, *A. arizonica*, *A. balsamea*,
A. concolor, *A. Grandis*, *A. lasiocarpa*, *A. shartensis*, *Larix laricina*,
L. lyalli, *L. occidentalis*, *Picea engelmanni*, *Picea sitchensis*, *Picea*
albicaulis, *P. aristata*, *P. arizonica*, *P. contorta*, *P. divaricata*,
P. echinata, *P. flexilis*, *P. lambertiana*, *P. monticola*, *P. murrayana*,
P. palustris, *P. ponderosa*, *P. resinosa*, *P. strobilus*, *P. strobiformis*,
P. taeda, *P. virginiana*, *Pseudotsuga taxifolia*, *Tsuga mertensiana*,
and *T. heterophylla*.

P. canadensis, *P. virginiana*, *Pseudotsuga taxifolia*, *Taxus canadensis*,
P. ponderosa, *P. resinosa*, *P. rigida*, *P. strobus*, *P. stricta*, *P. taeda*,
P. canadensis, *P. flexilis*, *P. latifolia*, *P. monticola*, *P. palustris*.

Polyporus schweinitzii Fr. grows best in the heart
 of the tree in the natural forests. It commonly attacks the heart
 wood of the base of trunks and of the roots of saplings
 growing especially the Douglas fir. The rot spreads from the
 up the trunk then the lower saw log. The fungus spreads from diseased
 of trees to healthy ones underground, where larger roots come in contact
 with each other. Where this takes place it is common to find
 groups of trees affected with the fungus, and sometimes an entire
 group of Douglas firs are killed outright. In most instances, however,
 over, the trees weakened by the fungus are either uprooted or broken
 off by the winds before decay.

The heart rot caused by *Polyporus schweinitzii* is of a red
 brown color, breaking into coarse cubes, and has been found in the
 following species of trees: *Abies balsamea*, *A. balsamea*,
A. concolor, *A. grandis*, *A. latifolia*, *A. sibirica*, *A. taeda*,
A. virginiana, *Picea canadensis*, *Picea engelmannii*, *Picea mariana*,
P. sitchensis, *P. taeda*, *P. virginiana*, *P. ponderosa*, *P. resinosa*,
P. rigida, *P. strobus*, *P. stricta*, *P. taeda*, *P. virginiana*,
Pseudotsuga taxifolia, *Taxus canadensis*, *Taxus virginiana*,
 and *T. heterophylla*.

A heart rot apparently identical with that caused by *Schweinitzii* is found in the following species of trees, upon which the sporophores of the fungus have never been found: *Juniperus monosperma*, *J. pachyphloea*, *J. scopulorum*, *J. utahensis*, *Taxus brevifolia*, and *Thuja plicata*.

Formes laricis (Jacq.) Murr. is the cause of a yellow to red-brown heart rot of living and dead trees of a number of species of conifers in the West. In the Northwest it causes a common heart rot of larches; and in the Southwest of some species of pines. It is known to attack the following species of trees: *Abies concolor*, *Larix occidentalis*, *Picea engelmanni*, *P. sitchensis*, *Pinus lambertiana*, *P. murrayana*, *P. ponderosa*, *Pseudotsuga taxifolia*, and *Tsuga heterophylla*.

In northern Arizona, *Pinus ponderosa* is diseased more often with this than any other fungus.

Echinodontium tinctorium E. & E. is the cause of a very interesting heart rot of living trees of a number of species of conifers. In the earlier stages of the rot, the wood is slightly discolored, and becomes very wet. The fungus discolors a portion of the wood, attacking first the spring wood of each annual ring, causing the wood to separate into flakes. Finally the wood is for the greater part dissolved and left in brown strings, leaving the tree hollow.

The following species of trees are attacked by *Echinodontium tinctorium*: *Abies amabilis*, *A. arizonica*, *A. concolor*, *A. grandis*, *A. lasiocarpa*, *A. magnifica*, *A. nobilis*, *Picea engelmanni*, *Pseudotsuga taxifolia*, and *Tsuga heterophylla*. This fungus is very

A heart not apparently identical with that caused by

the heart rot is found in the following species of trees, upon which

the sporophores of the fungus have never been found: Juniperus

horizontalis, J. pachyphloea, J. scopulorum, J. nana, Taxus

taxifolia, and Thuja plicata.

Portia laticincta (Lead.) Nutt. is the cause of a yellow to red-

brown heart rot of living and dead trees of a number of species

of conifers in the West. In the Northwest it causes a common heart

rot of larches, and in the Southwest of some species of pines.

It is known to attack the following species of trees: Abies concolor,

Pinus lambertiana, P. strobus, P. resinosa, P. mitis, P. jeffersonii,

Pseudotsuga taxifolia, and Taxus heterophylla.

In Northern Arizona, Pinus ponderosa is diseased more often

with this than any other fungus.

Helminthosporium lindqvistii F. & R. is the cause of a very

interesting heart rot of living trees of a number of species of con-

ifers. In the earlier stages of the rot, the wood is slightly dis-

colored, and becomes very wet. The fungus discolors a portion of the

wood, attacking first the spring wood of each annual ring, causing

the wood to separate into flakes. Finally the wood is for the greater

part discolored and left in brown shavings, leaving the tree hollow.

The following species of trees are attacked by Helminthosporium

lindqvistii: Abies amabilis, A. concolor, A. grandis,

A. lasiocarpa, A. magnifica, A. nobilis, Picea engelmannii, Pseudotsuga

taxifolia, and Taxus heterophylla. This fungus is very

destructive of the wood of hemlock trees in the Northwest, and of species of *Abies* wherever found in the West. It is not infrequent to find 50 to 90 per cent of mature trees diseased by it, and rendered useless for lumber or timbers.

A rot unaccompanied by sporophores similar to the one produced by *Echinodontium tinctorium* occurs occasionally in *Pinus ponderosa*, *Pinus contorta*, and *Thuja plicata*. In general, however, the fungus occurs on species of *Tsuga* and *Abies*, almost to the exclusion of other heart-rotting fungi, as in the case of *Trametes pini*, infection apparently taking place later in the life of the tree, and the former fungus inhabits the heart of the tree, to the exclusion of the other.

Polyporus sulphureus (Bull.) Fr., or a form of this species of fungus causes a red-brown rot of conifers, attacking both heart and sap wood. The rot caused by this fungus, resembling very much in color and appearance that caused by *Fomes laricis*, and to some extent that caused by *Fomes pinicola* (Sw.) Cooke. It is rarely found fruiting on living conifers. The wood of the following species is attacked by *Polyporus sulphureus*: *Abies grandis*, *A. magnifica*, *Larix occidentalis*, *Picea engelmanni*, *Pinus contorta*, *P. monticola*, *P. ponderosa*, *P. jeffreyi*, *Pseudotsuga taxifolia*, and *Tsuga heterophylla*.

Polyporus amarus Hedg. is the cause of the pin rot or peakiness of the incense cedar (*Librocedrus decurrens*) in Oregon and California. From 50 to 90 per cent of the older trees in this region are affected to some extent by this fungus, causing a great loss in the wood products of this valuable species of tree.

destructive of the wood of hemlock trees in the Northwest, and
of species of Abies wherever found in the West. It is not in-
frequent to find 50 to 90 per cent of mature trees diseased by it,
and rendered useless for lumber or timber.
A rot unaccompanied by sporophores similar to the one pro-
duced by *Basidiobolus cinereus* occurs occasionally in *Pinus*
banksiana, *Pinus contorta*, and *Pinus flexilis*. In general, however,
the fungus occurs on species of *Taxus* and *Abies*, almost to the ex-
clusion of other heart-rotting fungi, and in the case of *Pinus* and
infection apparently taking place later in the life of the tree, and
the fungus inhabits the heart of the tree, to the exclusion of
the other.
Polyphoma sulphurea (Bull.) Fr., or a form of this species
of fungus causes a red-brown rot of conifers, attacking both heart
and sap wood. The rot caused by this fungus, resembling very much
in color and appearance that caused by *Boreus latialis*, and to some
extent that caused by *Boreus pinicola* (Sw.) Cooke. It is rarely
found fruiting on living conifers. The wood of the following spe-
cies is attacked by *Polyphoma sulphurea*: *Abies grandis*, *A. magnifica*,
Taxus canadensis, *Pinus strobus*, *Pinus contorta*, *P.*
resinosa, *P. ponderosa*, *P. jeffreyi*, *Psuedotsuga taxifolia*, and
Taxus heterophylla.
Polyphoma annua Hedg. is the cause of the pin rot of
most of the immense cedar (*Libocedrus decurrens*) in Oregon and
California. From 50 to 90 per cent of the older trees in this
region are affected to some extent by this fungus, causing a great
loss in the wood products of this valuable species of tree.

A species of *Lentinus* either identical or closely related to *Lentinus lenideus* Fr. attacks the heartwood of both living and dead conifers. It forms very large fruiting bodies on *Pinus ponderosa* in Arizona, and causes a yellow to red-brown rot much like that produced by *Fomes laricia*, but less extensive. It also attacks the wood of *Pinus contorta*, *Abies concolor*, *Larix occidentalis*, and *Pseudotsuga taxifolia*.

A species of *Hydnum* related to *Hydnum coralloides* Scop. attacks the wood of both living and dead trees of *Abies concolor* (Gord.) Parry, *A. grandis* Lindl., *Picea engelmanni* Engelm., and *Pseudotsuga taxifolia*. The fungus fruits in late autumn, and produces a peculiar honey-combed rot, in which there is an absence of cellulose layers around the small cavities as in the rot caused by *Trametes pini*.

In general the heart-rotting fungi in conifers enter the trees through exposed heartwood in broken branches, fire scars, etc., and do not attack the sapwood first. This is especially true of *Trametes pini*, *Fomes laricis*, and *Echinodontium tinctorium*. In most localities in the Northwest *Trametes pini* often continues to fruit abundantly on dead logs and stumps long after the death of the trees, but in the Southwest the dry climate usually prevents the formation of sporophores except on living trees, and then only sparsely. This is considered the chief reason for the greater prevalence of this fungus in the Northwest.

Polyporus schweinitzii fruits on the roots and dead stumps of conifers, especially of the Douglas fir, all over the forests of the Western United States, but more abundantly in the Northwest

A species of *Penicillium* either identical or closely related to

Penicillium lanthornii Fr. attacks the heartwood of both living and
dead conifers. It forms very large fruiting bodies on Pinus ponderosa
in Arizona, and causes a yellow to red-brown rot much like
that produced by *Tomus latitans*, but less extensive. It also at-
tacks the wood of Pinus contorta, Abies concolor, Larix occiden-
talis, and Pseudotsuga taxifolia.

A species of *Hydnium* related to *Hydnium Agallodes* Scop.
attacks the wood of both living and dead trees of Abies concolor
(Gord.) Lamb., A. grandis Lamb., Picea engelmannii B.S.P., and
Pseudotsuga taxifolia. The fungus fruits in late autumn, and
produces a peculiar honey-combed rot, in which there is an absence
of cellulose layers around the small cavities as in the rot
caused by *Trametes pini*.

In general the heart-rotting fungi in conifers enter the
trees through exposed heartwood in broken branches, live scars, etc.,
and do not attack the exposed trunks. This is especially true of
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most localities in the Northwest *Trametes pini* often continues to
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